Silica Nanoparticles Based Gel Electrolyte for the Improvement of Performance and Stability of Dye Sensitized Solar Cells

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Sequential progress to search a next generation solar energy to electrical energy conversion device, dye sensitized Solar Cells have looked to be a promising candidate to the conventional solid P-N junction photovoltaic devices because of its low cost and high conversion efficiency. There are two major problems in long term operation of those devices which are evaporation of solvent and long time stability. Several efforts have already made to solve the leakage, sealing and stability of DSSCs . Recently, inorganic nanomaterials mixed with liquid electrolyte to make gel electrolyte and was successfully applied for the fabrication of quasi-solid state dye sensitized solar cells. In this work, we were fabricated quasi-solid state DSSCs with gel electrolyte which consists of silica nanoparticles in different concentration of liquid electrolyte (LiI , I2 and t-butyl pyridine in acetonitrile). Silica used as filler or gelator in gel electrolyte to increase the interfacial contact between the electrolytes and dye adsorbed TiO2 layer and filling of pores. TiO2 nanoporous. As a result of these, the overall conversion efficiency was achieved to be 3.50% of DSSC under 100mW/cm2 illumination with an open circuit voltage (Voc) of 0.69V, short circuit current (Isc) of 7.64mA/cm2 and fill factor 64.9%.